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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

(Case No. 98,766)

(NAL Case No. NAL-018)

In the Application of:

Jianzhong Jiao  
Matthew Lekson

Serial No.: 09/513,040

Filing Date: February 25, 2000

For: TUBULAR LIGHT SOURCE  
REFLECTOR AND LIGHTING DEVICE)

Group Art Unit: 2875

Examiner: J. Choi

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Commissioner for Patents  
Washington, DC 20231

DECLARATION PURSUANT TO 37 C.F.R. § 1.131

Dear Sir:

We, Jianzhong Jiao, residing at 22535 Fuller Drive, Novi, Michigan, 48374, and Matthew A. Lekson, residing at 23110 Cora Avenue, Farmington Hills, Michigan, 48336, hereby declare:

1. We are the named inventors on United States Patent Application Serial No. 09/513,040, filed on February 25, 2000.

2. The invention disclosed in the above-captioned patent application was conceived and reduced to practice prior to August 9, 1999.


3. Accompanying this Declaration is a photocopy of pages of our laboratory notebooks and design documentation illustrating a reduction to practice of our invention.

4. The invention was conceived and reduced to practice in the United States.

5. The date has been redacted from these photocopies; however the date is before August 9, 1999, the filing date of United States Patent No. 6,168,293.

6. We hereby declare further that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: Feb. 7, 2002

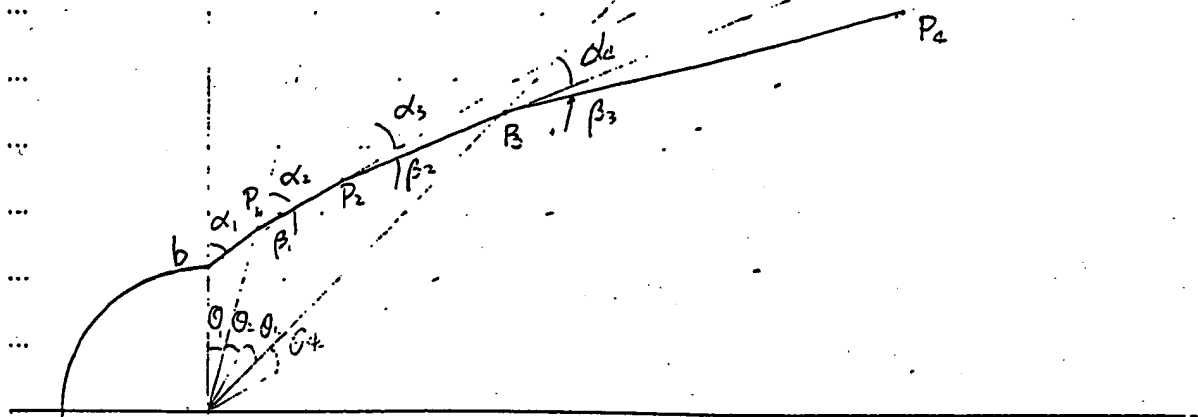
Signed:   
Jianzhong Jiao

Date: Feb 7, 2002

Signed:   
Matthew A. Lekson

**APPENDIX of DECLARATION PURSUANT TO 37 C.F.R. § 1.131**

Case 1, 15°



where  $P_1 = (x_1, y_1)$

$P_2 = (x_2, y_2)$

$$\downarrow \quad y_1 = \tan\left(\frac{\pi}{2} - \theta_1\right) x_1 = \cot \theta_1 x_1$$

$$y_1 - b = \tan\left(\frac{\pi}{2} - \alpha_1\right) x_1 = \cot \alpha_1 x_1$$

$$x_1 (\cot \theta_1 - \cot \alpha_1) = b$$

$$x_1 \frac{\sin(\alpha_1 - \theta_1)}{\sin \alpha_1 \sin \theta_1} = b$$

$$x_1 \frac{\sin \alpha_2}{\sin \alpha_1 \sin \theta_1} = b$$

P2

$$\therefore \begin{cases} x_1 = b \frac{\sin \alpha_1 \sin \theta_1}{\sin \alpha_2} \\ y_1 = \frac{x_1}{\tan \theta_1} \end{cases}$$

ex:  $\alpha_1 = 52.5^\circ$   $\theta_1 = 15^\circ$   
 $\alpha_2 = 37.5^\circ$

$$\begin{cases} x_1 = 1.69 \\ y_1 = 6.29 \end{cases}$$

$$2/ \quad y_2 = \cotg(\theta_1 + \theta_2) x_2 = \frac{x_2}{\tan 2\theta_1}$$

$$\theta_1 = \theta_2$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \tan \left[ \frac{\pi}{2} - (\theta_1 + \alpha_2 + \beta_1) \right]$$

$$= -\cotg(\theta_1 + \alpha_2 + \beta_1)$$

$$= \cotg(\theta_1 + \alpha_1 - \theta_1 + \beta_1) = \cotg(\alpha_1 + \beta_1)$$

$$y_2 - y_1 = \cotg(\alpha_1 + \beta_1)(x_2 - x_1)$$

$$x_2 [\cotg 2\theta_1 - \cotg(\alpha_1 + \beta_1)] = y_1 - \cotg(\alpha_1 + \beta_1) x_1$$

$$x_2 \frac{\sin(\alpha_1 + \beta_1 - 2\theta_1)}{\sin(\alpha_1 + \beta_1) \sin 2\theta_1} = y_1 - \frac{x_1}{\tan(\alpha_1 + \beta_1)}$$

$$x_2 \frac{\sin \alpha_3}{\sin(\alpha_1 + \beta_1) \sin 2\theta_1} = y_1 - \frac{x_1}{\tan(\alpha_1 + \beta_1)}$$

$$\therefore \begin{cases} x_2 = \left( y_1 - \frac{x_1}{\tan(\alpha_1 + \beta_1)} \right) \frac{\sin(\alpha_1 + \beta_1) \sin 2\theta_1}{\sin \alpha_3} \\ y_2 = \frac{x_2}{\tan 2\theta_1} \end{cases}$$

$$\begin{cases} x_2 = 4.6 \\ y_2 = 7.17 \end{cases}$$

$$3) \quad y_3 = \operatorname{ctg}(3\theta_1) x_3$$

$$\frac{y_3 - y_2}{x_3 - x_2} = \operatorname{ctg}(\alpha_3 + \beta_2 + 2\theta_1)$$

$$= \operatorname{ctg}(\alpha_1 + \beta - 2\theta + \beta_2 + 2\theta_1) = \operatorname{ctg}(\alpha_1 + 2\beta_1)$$

$$y_3 - y_2 = \operatorname{ctg}(\alpha_1 + 2\beta_1)(x_3 - x_2)$$

$$x_3 \left[ \operatorname{ctg} 3\theta_1 - \operatorname{ctg}(\alpha_1 + 2\beta_1) \right] = y_2 - \frac{x_2}{\operatorname{tg}(\alpha_1 + 2\beta_1)}$$

$$\therefore \begin{cases} x_3 = \left[ y_2 - \frac{x_2}{\operatorname{tg}(\alpha_1 + 2\beta_1)} \right] \frac{\sin(\alpha_1 + 2\beta_1) \sin 3\theta_1}{\sin \alpha_4} \\ y_3 = \frac{x_3}{\operatorname{tg} 3\theta_1} \end{cases}$$

$$\begin{cases} x_i = \left[ y_{i-1} - \frac{x_{i-1}}{\operatorname{tg}(\alpha_1 + (i-1)\beta)} \right] \frac{\sin(\alpha_1 + (i-1)\beta) \sin i\theta_1}{\sin \alpha_{i+1}} \\ y_i = \frac{x_i}{\operatorname{tg} i\theta_1} \end{cases}$$

$$\text{If } \alpha_1 = \alpha_2 = \dots = 0 \\ \beta_1 = \beta_2 = \dots = \beta$$

$$\alpha_2 = \alpha_1 - 0$$

$$\alpha_3 = (\alpha_2 + \beta) - 0$$

$$= \alpha_1 + \beta - 20$$

$$\alpha_4 = (\alpha_3 + \beta) - 0$$

$$= \alpha_1 + 2\beta - 30$$

$$\begin{array}{l} 1 \quad 52.5^\circ \\ 2 \quad 37.5 + 7.5 = 45 \\ 3 \quad 30 + 7.5 = 37.5 \\ 4 \end{array}$$

$$\begin{array}{r} 52.5 \\ + 15 \\ \hline 67 \end{array}$$

$$\alpha_i = \alpha_1 + (i-2)\beta - (i-1)0$$

$$i \geq 2$$

also

$$\alpha_1 = \left( \frac{\pi}{2} + 0 \right) / 2$$

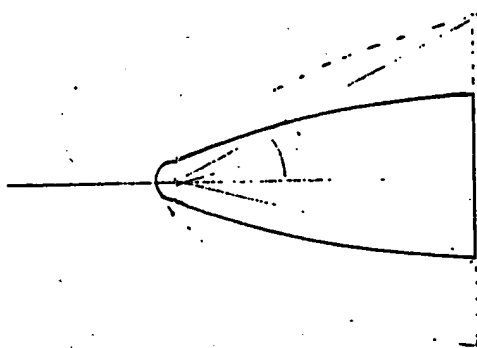
$$\beta = \frac{0}{2}$$

52.5000	0.8433	3.1470
37.5000	2.3038	3.9903
30.0000	5.1828	5.1828
22.5000	12.2627	7.0798
15.0000	40.0997	10.7446
7.5000	0.0000	0.0000

15° case

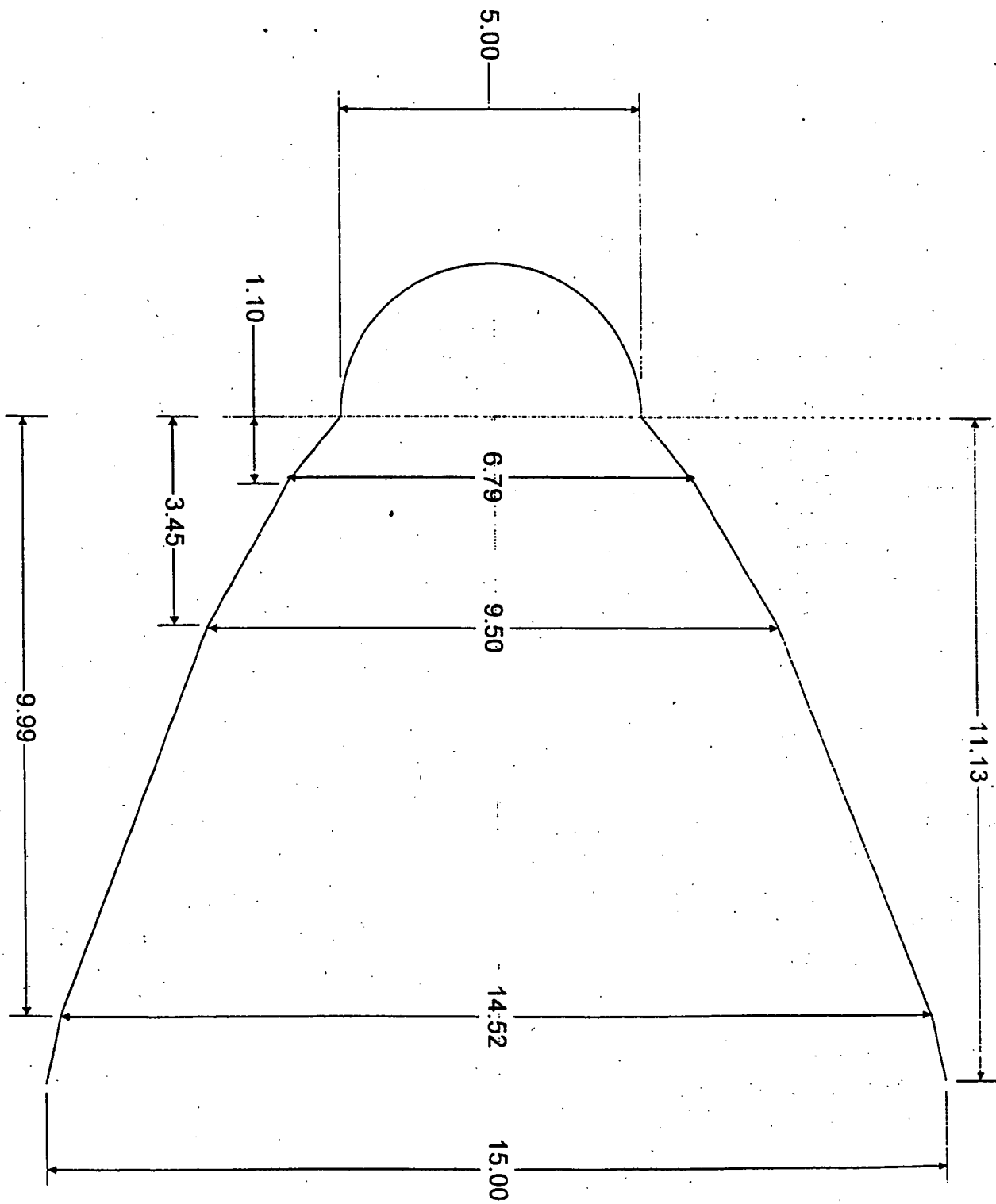
$R = 2.5$  mm for the light source tube

$T = 10.7446$  or  $D = 21.5$  mm for the light pipe









Reflector and FMVSS Requirements for a CHMSL

